The ordinary method of connecting the ends of catgut, when used as an endless line for machinery, is by means of a steel hook and eye, the hollow stem of each being screw-tapped, for the purpose of holding the catgut.

Mr. Nicholls substitutes for the above arrangement a double hook C C and two eyes A B. The catgut is secured to each of the eyes in the ordinary way, and the hook is an independent piece, and somewhat similar in shape to the letter S, except that each hook is at right angles to the other.

The advantages of this arrangement are, that the hook is less liable to jump on the pulley, it affords more play for the twist of the band, and the openings of the hooks being made very small, the eyes are not liable to be unhooked.

No. VII.

EXEMPLIFYING MULTIPLICATION-TABLE.

The Thanks of the Society were voted to Dr. CHARLES WILLIAMS, of Charles Street, Westminster, for his Mechanical Table for Teaching Arithmetic; a Model of which has been placed in the Society's Repository.

SIR,

I BEG permission to submit, for the consideration of the Society of Arts, my Exemplifying Table for illustrating the principles of arithmetic.

A very little reasoning will suffice to shew that, in

teaching the rudiments of arithmetic, children are better enabled to form an accurate conception of the value and properties of numbers where they are represented by "sensible objects." For instance, a child may repeat the square of eight without annexing to it any definite idea, but illustrate the operation by a diagram, and the fact will be indelibly impressed upon his memory.

The object of the present simple invention is to apply this principle generally in developing the rudiments of arithmetic. The table can be made four feet square for class-teaching, or it can be constructed of pasteboard at a trifling expense, so as to be carried in the pocket without inconvenience.

I am, Sir, &c. &c.

W. A. Graham, Esq. C. J. Williams.

The table may be fixed on a board of any dimensions, upon which is described a square divided into 144 black and white squares, any required number of which squares are at once exhibited by means of two slides, the one movable in a lateral direction from one side of the board to the other, while the other is movable from bottom to top of the board, or *vice versâ*.

Multiplication.—Set the under slide to the figure to be multiplied, or the multiplicand, and by moving the upper slide progressively the product will be demonstrated by the number of black and white squares. The pupil will by this means perceive that the product is not altered by transposing the multiplier and multiplicand; thus, 7 6s must be the same as 6 7s, for whether we count the squares from the 6 or the 7, the result will be the same.

Addition.—The number of squares may be easily reckoned by counting them in rows; thus, 4 and 4 are 8,

and 4 are 12, &c., which will familiarise the tyro in the practice of addition, by connecting a number with an object before him.

Division.—The principles of division may be clearly demonstrated by calling the squares the dividend, and the last figures, next to the slides, the divisor and quotient; for instance, the 7s in 42 are 6, in 35, 5, &c., and by moving the slide back, and taking off 7 at each operation, the principles of subtraction are explained. Thus multiplication and addition are clearly defined by working the slide downwards, and division and subtraction by the opposite motion.

Fractions.—The nature and value of fractions may be illustrated by the same table; for as fractions are parts of a unit, a row of squares will represent the denominator, or the number of parts into which the unit is supposed to be divided, and any number of those parts will indicate the numerator; for example, the fractions $\frac{3}{4}$, $\frac{6}{7}$, $\frac{8}{12}$, may be expressed by setting the slide to 4, 7, or 12, and pointing out the number of those parts which constitute the numerator. The nature of decimals may also be shewn, by having an additional under slide, and subdividing each square into ten parts by the same number of cross-lines.

By this method the pupil will always have the evidence of the fact before him, and he will readily comprehend the relation of the different numbers, and how they affect and combine with each other.